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ANTHRACITE DEVELOPMENT AND RAILWAY PROGRESS

AN ADDRESS

By WILLIAM HENRY WILLIAMS,
Vice President, The Delaware and Hudson Company,

At a Luncheon at the Hotel Casey, Scranton, Pa.,
April 24, 1923.

To celebrate the One Hundredth Anniversary of the
Founding of The Delaware and Hudson Company

ANTHRACITE DEVELOPMENT AND RAILWAY PROGRESS

by

WILLIAM HENRY WILLIAMS

The history of The Delaware and Hudson Company began in the anthracite region of Pennsylvania when the first twigs of a prehistoric forest pushed upward in the dank atmosphere of the Carboniferous age. It might be traced through strange eons while Nature seemed in extravagant warfare with itself, alternately creating a land of amazing faunal and floral fecundity and then supplying vast volcanic forces to destroy the abundant life that had arisen and sterile seas to sweep every vestige of vitality from a submerged land.

Yet nothing was lost. Nature wastes nothing. When seemingly most extravagant and reckless, if man would but comprehend her methods, she is merely practicing a vaster economy and a more time-searching conservation. Today and here, at least, we are able to read, indelibly written on the profound pages of the Lackawanna and Wyoming valleys, the truth that during a myriad of generations, as humanity must measure time, when seemingly bent only on destruction, Nature was creating and storing for humankind her wondrous gift of coal.

Coal was to The Delaware and Hudson Company, and its railway, as cause to effect. It was that, also, to that earliest locomotive of which we boast, and to the steam engine, in which every locomotive had its genesis. The first uses of the inventions of Newcomen and Watt were in pumping English coal mines. And *railed* roads were known to the mining practice of Newcastle-on-Tyne for two hundred years before the first common carrier *railroad* came into being with the opening of the Stockton and

Darlington on September 27, 1825. Regular use of locomotives in English colliery practice antedated the Rainhill competition by not less than seventeen years. Precisely as the railway, the steam engine and the locomotive were developed as incidents of English colliery practice, just so The Delaware and Hudson's railway system was evolved to enable the mining and marketing of the "black stones" or "stone coal" or "anthracite" of this region. It is a romantic and fascinating story.

Men knew something of the fuel content of northeastern Pennsylvania long before the wisest suspected its value. The American Indians appear to have known that it would burn and occasionally to have resorted to its use as early as the year 1710, but there is no record of similar knowledge on the part of any white man until fifty-two years later. Discoveries of coal at different dates seem to have been made in the Wyoming, Lehigh and Schuylkill regions. The first recorded is that of Parshall Terry and a group of Connecticut settlers in the Wyoming Valley, who found anthracite on the banks of the Susquehanna river near the site of Wilkes-Barre. Four years later, James Tilghman, of Philadelphia, reported finding what is probably the same bed of coal and a small sample was sent to William Penn, then in London, with the modestly prophetic remark that—

> "This bed of coal, situated as it is on the side of the river, may some day or other be a thing of great value."

The existence of anthracite at Carbondale became known in 1799. These discoveries received little attention and few among those to whom they became known suspected their significance. The region was remote, rugged, inaccessible and wild. Roads were few and so poor, where they existed at all, that they would now be regarded as impassable. Its rivers were torrential and were not navigable except after costly improvements.

Moreover, it was doubted whether anthracite could successfully be burned for any fuel use. It actually had been used at the Government arsenal at Carlisle, in aid of the manufacture of arms for Revolutionary soldiers, for in 1776, two Durham boats which had been sent to Wyoming were loaded with coal at Mill Creek, a few miles below the mouth of the Lackawanna river, and floated down the Susquehanna to Harrisburg, where the coal was unloaded and conveyed in wagons to the arsenal. This is the first recorded shipment and the first known industrial use. It made little impression for in 1800 William Morris was unable to sell a wagonload which he had taken to Philadelphia.

In 1808 Judge Jesse Fell, who "kept tavern" in Wilkes-Barre, and was in other respects a man of standing and enterprise, burned anthracite successfully in a grate. He wrote that he had succeeded in burning "the common stone coal of the valley" in a grate, in a common fireplace, and had found that it would serve as fuel, making a cleaner and better fire at less cost than wood.

In 1812, Colonel Shoemaker, of Pottsville, hauled nine wagonloads of anthracite to Philadelphia, and could sell only two, giving the balance away. He narrowly escaped arrest, on the charge of attempting to sell for fuel something entirely worthless. His enterprise cost at the rate of about $28.00 per ton, but was an important step in obtaining recognition of the fuel value of anthracite, principally because a wagonload was sold to White and Hazard, who operated a wire-works at the Falls of the Schuylkill. An whole night was consumed in efforts to make the coal burn and, in final despair, the workmen abandoned the endeavor but chanced to leave the door of the furnace shut. Fortunately, one workman forgot his jacket and, returning to recover it, found an excellent fire and the furnace red-hot.

During this year, the war of 1812, interrupting trade between Virginia and Liverpool, cut off the normal supply of charcoal and brought about very high prices; so that men who knew the properties of anthracite undertook to push its use as a substitute. It was probably under this stimulus that William Wurts, whose enterprise led ultimately to the organization of The Delaware and Hudson Company, then a progressive merchant of Philadelphia, began to acquire coal lands. He was attracted to the Carbondale region and finally obtained a large acreage. William and his brother Maurice Wurts, opened mines and sent their first arkload to Philadelphia in 1815. This shipment was hauled to the Lackawaxen river in wagons, at a cost of $2.50 per ton, and there loaded in arks in which it was floated to the Delaware river and onward to Philadelphia. Clark's history of the Wyoming Valley repeats an interesting comment, made in 1849, from an almost contemporary source, upon the efforts of these brothers:

> "The building of the Pacific Railroad will not compare in any acceptable sense to the early efforts of these two hardy men in forest undertaking to reach the civilized world with a commodity that carried with it prejudice instead of favor. They hardly knew rest for body, soul, strength and mind. They slept in the woods; fared like barbarians; were beset with natural obstacles; were devoid of capital sufficient to see the way ahead of them; were ridiculed as adventurers; were persecuted by their neighbors; were hindered by malicious falsehoods and were traduced by rivals until their sublime mastery commanded respect."

Between 1812 and 1822, the Wurts brothers acquired coal lands sufficient for their purposes but their efforts to market this product in Philadelphia met with nothing but failure and disappointment. Their last attempt to sell in that market was during the later year. Abandoning it, then, to their competitors in the nearer Lehigh region, they turned to New York, a potential

market in which anthracite was as yet totally unknown. By 1820 the region now known as Greater New York had a population of 152,056, more than twice that of Philadelphia, but there were no direct routes of communication with the anthracite fields and no local demand for anthracite existed. In order to sell coal in this metropolitan market, it was necessary again to demonstrate its utility and to create practicable means of transportation. Attention was immediately given to both necessities.

By 1822 plans had matured for a transportation system to consist of a gravity railroad, a series of inclined planes operated by rope haulage, and a connecting canal to the Hudson river. Early in 1823 Pennsylvania conferred authority to improve the navigation of the Lackawaxen and Delaware rivers and one hundred years ago, New York granted its legislative charter to "The President, Managers and Company of The Delaware and Hudson Canal Company," whom it endowed with power to construct a canal connecting the waters of the Delaware and Hudson rivers. In 1824 Pennsylvania authorized the New York corporation to purchase the interests of Maurice Wurts.

The active minds in this enterprise were attracted by English progress in the development of the steam locomotive and resolved to experiment with locomotive traction at Honesdale. Accordingly, locomotives were ordered from England, one of which is commonly known as the "Stourbridge Lion." This imported locomotive was given a trial steaming on its arrival at New York, using anthracite as its fuel. The especial significance of this to the people of New York was not as the first exhibition of a steam locomotive on the American continent, but that it demonstrated the existence of a previously unrecognized fuel and a step in obtaining a local supply. This is em-

phasized by the report contained in the "Morning Courier and New York Enquirer," of June 12, 1829, which said:

> ".....pleased as we were, however, with the engine, we were much more pleased by the practical demonstration offered of the importance and usefulness of the coal which the Company proposes to bring to market. It is now reduced to a certainty that the Lackawaxen coal will generate steam in sufficient quantities to answer all the purposes to which it is applied and this fact is not only of great importance to the Company, but it is worth millions to our State."

The "Stourbridge Lion" was sent to Honesdale and ran its trial trip there on August 8, 1829. It was the first locomotive placed on any track outside of England, and the first that ever turned a wheel anywhere on the Western Hemisphere.

I wish to emphasize the fact that this first locomotive was not imported for passenger or general freight service, but solely to assist in transporting and marketing anthracite. This product was worthless in Pennsylvania hills and valleys until some efficient way to get it to market had come into practical existence.

The first load of canal borne coal reached New York City on December 10, 1828, but four years earlier, in anticipatory efforts to create a market, the company had contrived to have a boatload delivered in that city. The problem of marketing was always imminent in the eyes of these, our predecessors, and from it there never has been and never will be any escape.

On May 20, 1829, the Board of Managers authorized the President to have cooking apparatus installed in the banking house, in order to show that the company's coal could be burned therein. During the next year they investigated the Boston market; sent samples to Providence and even shipped several hogsheads containing anthracite to New Orleans. In 1831 it

was arranged to furnish the Ulster Iron Company with coal for experimentation in steam production and the steamboat "Experiment" with enough for a trip to Newburgh and return. During the same year coal was supplied for the steamboat "Victory" and for the use of the Walnut Street ferry boat, and employment was given to Nathan Smith "to introduce the use of coal in manufactories and all establishments using steam engines," and to R. Spencer "for introducing the use of coal to blacksmiths, etc."

Efforts to extend the use by boats continued and, in 1836, anthracite was first used for a round trip to Albany. On June 23 of that year, the "Novelty," with the Managers of this company and distinguished guests, left her wharf at six in the morning and arrived at Albany twelve hours later, the first steamboat propelled by anthracite to achieve that voyage. In 1848 experiments were made in the use of anthracite in the manufacture of salt at Syracuse and Salina, and upon the results of these experiments an expenditure of $10,000 to promote the adoption of this fuel was authorized. In 1868 the company began forwarding coal down the Susquehanna to Baltimore, along the lines of road connecting Wilkes-Barre with Jersey City, and it was noted that during the following year they anticipated entering "the great and rapidly developing market of the west."

With developing markets there came great changes in preparation for market. The earliest uses were principally, if not wholly, in iron works and in steam production. Large chunks were best adapted to these purposes and the output was then designated as "lump" coal. Later, there came to be a separation into two sizes, named in accordance with their chief uses; "steamer lump," and "furnace lump." For domestic use a smaller size was demanded. It became necessary, therefore, to

break some of the larger sizes and to develop a size known as "grate" or "broken." Later, with improvements in appliances for domestic heating and cooking, there came to be a market for still smaller sizes, known as "egg" and "stove." These constituted for many years practically the only marketable sizes, and to save the cost of bringing to the surface a great weight of the smaller and unmerchantable sizes, each miner was provided with a rake, the prongs of which were two to three inches apart, and told to leave in the "gob" all the coal which would pass through these prongs. Such rakes were in use until about the year 1880.

Moreover, the material taken to the surface became, to a considerable extent, crushed during preparation and sizing, producing more unmarketably small coal which had to be treated as refuse and dumped, with rock and slate, in the culm banks. It was not through carelessness or willingness to waste any marketable coal that these small sizes accumulated in the mines and in the old culm banks, but the disposition made of them was one of the necessities of the day.

From time to time, progress in the use of anthracite has brought, one by one, the smaller sizes into use. Even coal dust can now be used in sintering plants and in briquetting and it may not be long before there is a market for every particle of combustible material that can be mined. The first market, that for furnace lump, which was used mainly in blast furnaces for making pig iron, has been completely supplanted by the use of coke, a cheaper product, and although anthracite *could* still be used in making pig iron, that market has permanently disappeared.

The problems of marketing are not ended. As the oldest are surmounted, others arise, and some are perennial. Although

anthracite is now sold from New Brunswick, in Canada, to the Potomac river, and westward to Duluth, St. Paul and Denver, it enjoys no monopoly in any market. Its relative freedom from dust and dirt and its smokeless character, give it an advantage over bituminous coal, in all domestic uses and in cities where smoke is objectionable, but, save in those communities in which the use of smoke-producing fuels is forbidden by effective public authority, this advantage would not overcome a materially greater difference in price than that necessarily resulting from present mining conditions. In certain markets there is no advantage over natural gas or oil, and elsewhere by-product coke can be sold at prices which constitute effective competition.

Anthracite is nowhere a necessity of life in the sense that actual suffering would result if it ceased to be marketed and sold. Even for domestic use, purchasers will pay only a well-defined margin over the price of bituminous coal. The smaller, or steam sizes, are never sold, save in competition with bituminous coal or coke or fuel oil, or all of them, and this rivalry is simply a matter of dollars and cents of price. The user of anthracite for steam purposes must be convinced that its cost, measured by its efficiency, is no greater than that of the substitutes, the only exception being where smoke is effectively prohibited and the use of anthracite thereby becomes compulsory. Such ordinances, however, are man-made, and protect even these limited markets only while the cost of cleanliness is reasonable.

It should always be borne in mind that if production of anthracite should wholly cease, it would be easily possible, under present conditions, to mine and produce in this country enough bituminous coal to substitute that fuel in every place and every use to which anthracite is now being put: that this could be

accomplished, without opening a single new bituminous mine, by simply working nearer to capacity and more regularly those which now exist.

Progress in mining practice and in the preparation of anthracite for market would in themselves furnish material for an extended address. The elimination of impurities was for years accomplished by hand picking; later, automatic, mechanical appliances were devised, and these are still in process of improvement. All such devices depend upon the difference between the specific gravity of slate and of coal. Hand picking was first supplemented by inclined chutes with gaps over which coal would jump, but through which slate would drop owing to its inferior momentum. While these methods were used, the coal was usually handled in a dry state, resulting in a great deal of dust. The next important step in automatic cleaning was the adoption of the "jig" by which coal, sprinkled and made wet on entering the breaker, thus settling the dust, is agitated while immersed in water and the slate sinks to the bottom while the coal is recovered at the top. Other inventions are claimed to advance the art of separation. These immerse the material to be separated in mixtures of sand and water, kept at such a consistency that the line of separation between slate and coal becomes very sharply defined. Experiments have not reached a point at which it is possible finally to determine whether they can be substituted for the jigs, but great hopes are entertained.

The problems of mining are administrative and mechanical. Fifty years ago the racial elements represented in the mines were English, Scotch, Welsh and Irish. A few Welsh and Irish remain, but for many years recruiting has been from the southern or southeastern races of Europe and now not less than thirty-four dialects are recognized among the mine workers.

Relations between employes and employers have been fixed by processes in which negotiation and agreement have been intermixed with superimposed authority, so that it is difficult to define the limits of either. The great constructive work of the Anthracite Coal Strike Commission, appointed by President Roosevelt, in 1902, continues to be the ground work of these relations, but there have been great advances in wages and material reductions in the hours of labor. And there is now practical recognition of the union known as the United Mine Workers of America which was in specific terms declared by that Commission to be undesirable. A short strike in 1912, and the strike of last year, which was only one day shorter than the strike of 1902, have been the only general interruptions to the orderly conduct of the industry since the award of twenty years ago. Local strikes, principally "button" strikes, which are for the purpose of forcing every mine worker to belong to the union and to pay dues to its treasury, are of frequent occurrence in the experience of every operator, although they are in flagrant violation of the agreement, in contractual form, to which the Mine Workers' Union is a party.

Collective bargaining, and contractual relations resulting from such bargaining, can never be fully effective, in the sight of either party, until both recognize such contracts as having the exact status of other contracts relating to business and their legal and moral obligations are fully respected on all sides. Consumers who have adjusted themselves to a regular supply of anthracite, and whose comfort is measurably dependent upon the continuance of such supply, cannot have that full protection which they are entitled to ask, until great combinations of labor are charged with the same public responsibility and obligations which attach to other combinations in trade and industry.

Although the literature of mine-engineering is extensive, there is nothing in print in this country, and very little in England, which could enlighten the miner as to the methods by which he could attain maximum earnings by increasing the efficiency of his work at the face. Practical inquiry resulted in assigning instructors, in the actual work of mining, to the ten or twelve employes in each operation whose earnings were least. This effort has been continued long enough to show that by instruction thus given, the average earnings of a group of miners thus selected, can be increased $1.00 to $1.25 per day. This instruction covers the proper placement of the hole, the angle, depth and size to be drilled, the character and quantity of explosives to be used, the method of tamping, etc.

Progress in mechanical methods has reached the point at which, by means of undercutting machines and electrically operated scraper lines, coal can be taken from veins of 24 to 28 inches thick, without the removal of either the top or bottom rock. This, and the application of scientific methods to second mining, is resulting in a conservation of this great natural resource which would have seemed utterly impracticable twenty years ago.

Some of the mechanical measurements are startling.

This company elevates to the surface fourteen tons of water for each ton of coal that is prepared and sent to market from its mines. The mine tracks, under ground, in its collieries, have a combined length of 650 miles, or more than two-thirds the length of the great railway system that has been developed as an incident to the marketing of the coal. Each miner is a shipper, who must have several mine cars delivered one at a time during the day, and 20,000 of these cars have been loaded and unloaded in one working day.

Anthracite is recovered from ten to twelve superimposed beds at a single operation, each bed extending over an area of from eight to ten square miles, making a total of from eighty to one hundred twenty square miles for one colliery operation. Owing to the greater depth of anthracite mines and the complicated and costly apparatus required in the preparation of hard coal, the present cost of a new operation, capable of an annual output of one million tons, is about $8,500,000, for the anthracite region; while in the bituminous fields the average cost of a plant capable of similar output would be approximately $2,500,000.

The foresight and courageous efforts of William and Maurice Wurts have led to results that their aspirations can never have included; the magnitude of which they can never have anticipated. Beyond the lands and mines and breakers in this anthracite region, these results include the ownership, through the corporation which they created, of a railway system extending far into Canada with incidental properties and interests of diverse character and of immense value. The benefits to multitudes who have never become associated as participants in the enterprise they inaugurated, are immeasurable. Their work has contributed very largely to the upbuilding of the great cities of the Lackawanna and Wyoming valleys and to the prosperity of the Commonwealth of Pennsylvania. Even outside of the anthracite region and outside of this Commonwealth, their activities laid the foundation for trade and have extended the civilizing influences of commerce. They, and their associates, were doubtless far in advance of the great majority of their contemporaries, but even they built better than they knew, and if they could return to this celebration they must marvel at the tremendous and far-flung consequences of their enterprise.

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